HERITAGE REMEDIATION/E...NEERING, INC.

5656 Opportunity Drive
Toledo, OH 43612
Phone: 419/478-4396
FAX: 419/478-4560

March 13, 1992

Mr. A. William Nosil
Corp. Environmental Eng. Manager
HEXCEL CORPORATION
11711 Dublin Blvd.
Dublin, CA 94568-0705

Re: Preliminary Feasibility Study Report for Alternate Discharge to the PVSC
Fine Organics Corp. Site
Lodi, NJ
HR/E Project No. 60027

Dear Mr. Nosil:

The attached report is in response to Work Order 44 for evaluation of discharge alternatives. As you will note, we have prepared copies for immediate delivery to Lisa Bromberg. We are also preparing copies for Frank D'Ascensio, PVSC, and Gary Sanderson, BECRA.

The report is preliminary in that some additional information is required to evaluate some of the alternatives.

If you have any questions do not hesitate to contact us.

Sincerely,
HERITAGE REMEDIATION/ENGINEERING, INC.

Joseph D. Ritchey, P.E.
Project Director

attachment
cc: Lisa Bromberg
Frank D'Ascensio
Gary Sanderson

60027/15.4
92JR1008.T1

100% Recycled Paper

# ALTERNATE DISCHARGE
# OF
# GROUND WATER
# PRETREATMENT SYSTEM

## PRELIMINARY FEASIBILITY STUDY
## FOR
## FORMER HEXCEL CORPORATION
## SITE

Lodi Borough, Bergen County
Lodi, NJ

ECRA Case #86009

Submitted to:

HEXCEL Corporation
11555 Dublin Boulevard
Dublin, CA 94568

Prepared by:

Heritage Remediation/Engineering, Inc.
5656 Opportunity Drive
Toledo, OH 43612

March 16, 1992

TABLE OF CONTENTS

Appendices:

List of Tables:



List of Figures:

## 1.0 INTRODUCTION

This report has been prepared to evaluate the technical feasibility of various alternatives for discharge of ground water from the pretreatment system owned and operated by Hexcel Corporation. This system is located in Building I at the Fine Organics Corporation (FO) facility at 205 N. Main St., Lodi, NJ (Figure 1). The pretreatment system consists of a chemical treatment unit, dual air stripping towers, and granular activated carbon filtration units. A schematic of the pretreatment system is attached as Figure 2. The primary means of discharge has been to the Passaic Valley Sewerage Commission (PVSC) industrial sewer.

This report is submitted as a preliminary document due to lack of availability of critical information necessary to complete the evaluation of alternatives. Table 1 presents a summary of tasks and time frame for completion of the feasibility study and report.

### 1.1 Existing Sewer Connection Permit

The Fine Organics Corp. Sewer Connection Permit # 17405042 was effective on May 27, 1991. It included discharge and monitoring requirements for pretreated ground water and basement seepage resulting from Hexcel Corporation's operation of a ground-water pretreatment system. The Hexcel portion of the sewer connection permit expired on November 30, 1991.

In a letter to Mr. Frank D'Ascensio (PVSC) from Mr. A. Wm. Nosil, Hexcel Corporate Environmental Engineering Manager, dated July 9, 1991, a request was made to adjust the start and stop date of the permit to coincide with the receipt of the SIU permit and authorization to operate the pretreatment system. We assumed that some type of extension must be granted to allow continued operation of the batch pretreatment and discharge of basement seepage water. Furthermore, we assumed that some type of extension must be granted for future operation of the pretreatment system to enable engineering of an alternate disposal option. Thus, the letter of July 9, 1991 was prepared.

In a letter to Mr. Frank D'Ascensio from J. D. Ritchey dated December 19, 1991, a request was made to allow discharge of 7,200 gallons of pretreated water per day for a six month period. This request was to allow evaluation of typical ground water requiring pretreatment and then to allow evaluation, selection, design and installation of an alternate discharge.

On January 12, 1992, J. D. Ritchey had a telephone conversation with Mr. Carmen Della Pia (PVSC) regarding pretreatment and discharge of basement water. Mr. Della Pia indicated that the PVSC would prepare a letter authorizing batch treatment and discharge, as had been allowed in the sewer connection permit. This telephone conversation was documented in a letter by Mr. Ritchey, dated January 16, 1992, to Mr. D'Ascensio.

## 1.2 Status of the Application for a Significant Industrial Users Discharge Permit

Hexcel has not been able to put the ground-water pretreatment system into operation due to delay in the issuance of a Significant Industrial User (SIU) discharge permit by New Jersey Department of Environmental Protection (NJDEP) Bureau of Industrial Discharge Permits. The SIU permit application was filed on May 28, 1990. In a response by William Boehle, Chief of the DSW/SIU Sections of the Bureau of Industrial Discharge Permits, a SIU permit was not required. However, following submittal of the Treatment Works Approval permit application on September 19, 1990, the Permit Section reversed its decision, requiring a SIU permit. This application was filed on January 11, 1991. The draft permit was issued on December 17, 1991. Public Notice was made February 3, 1992, with a closing date of March 4, 1992. Hexcel submitted comments to the draft permit and so did representatives of Fine Organics. We are uncertain as to issuance of a final permit.

## 1.3 History of Seepage Water Pretreatment

Presumably for many years of plant operation basement seepage water was pumped into the PVSC industrial sewer without treatment. In about November, 1985 at the time of identification of PCBs at the site, pretreatment of the seepage water was initiated. Pretreatment consisted of diatomaceous earth and granular activated carbon filtration with batch testing for PCBs. Water was discharged to the PVSC following demonstration that samples yielded non-detectable results for PCBs. This procedure was followed with some success until 1989 when complete removal of PCBs became more difficult. At that time, FO began shipping seepage water off-site to the Chambers Works DuPont facility in Deepwater, NJ. Increasingly stringent acceptance limits by DuPont resulted in pretreatment by FO by diatomaceous earth and granular activated carbon filtration. In August 1989, DuPont discontinued acceptance of the seepage water due to the presence of PCBs at unacceptable levels. In September, 1990 HR/E was contracted to begin treatment of the seepage water as part of site remediation activities. This activity has been performed on a batch chemical treatment with carbon filtration basis since that time. HR/E has conducted some operational tests of treatment and monitoring equipment of some well water during pilot studies. This batch pretreatment, testing and discharge has been conducted in accordance with the terms of the PVSC discharge permit. Figure 3 illustrates the monthly discharge of pretreated water for the period from November, 1990 to December, 1991.

During the period that HR/E has been operating the pretreatment system, the basement seepage has on average totaled 200 gallons per day (gpd).

# Pretreated Water Discharged to PVSC

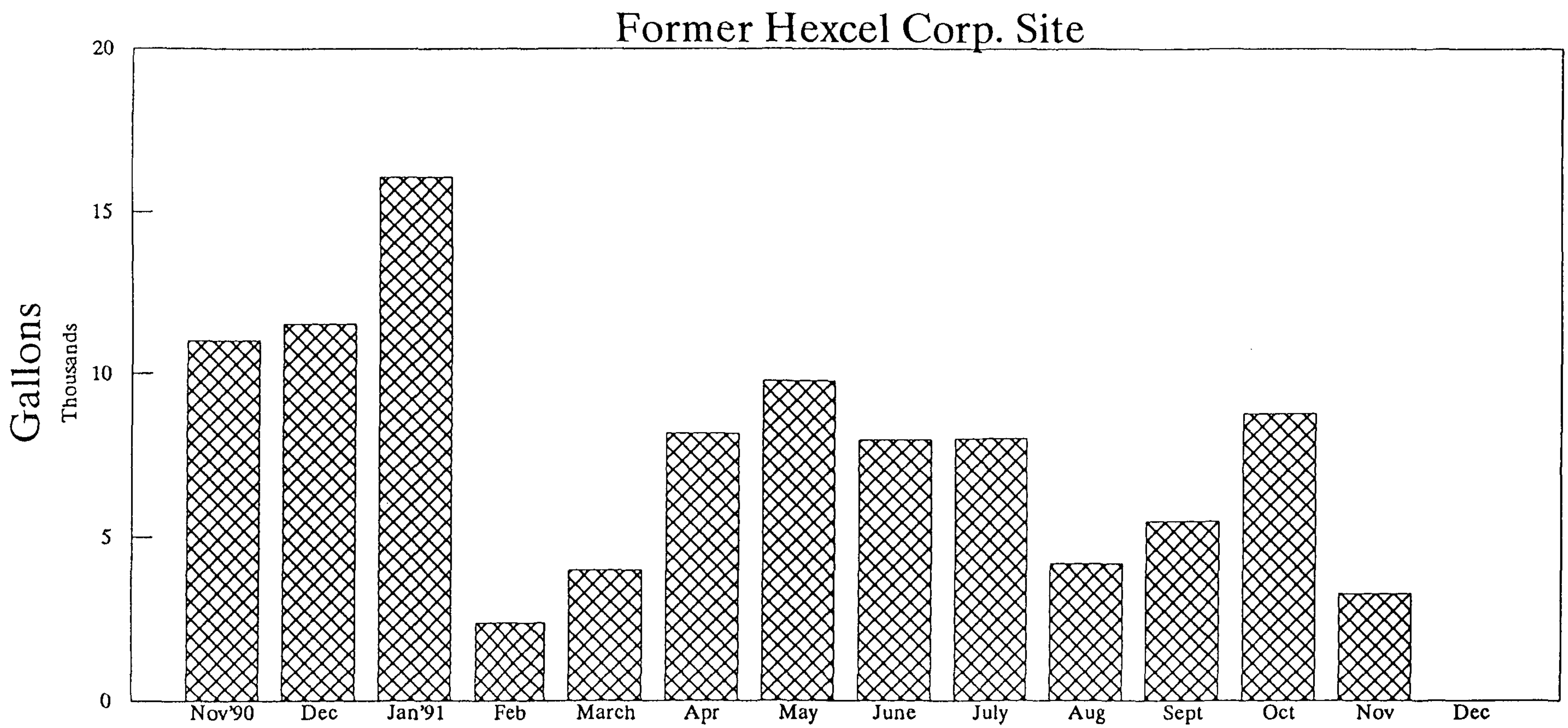



Figure 3

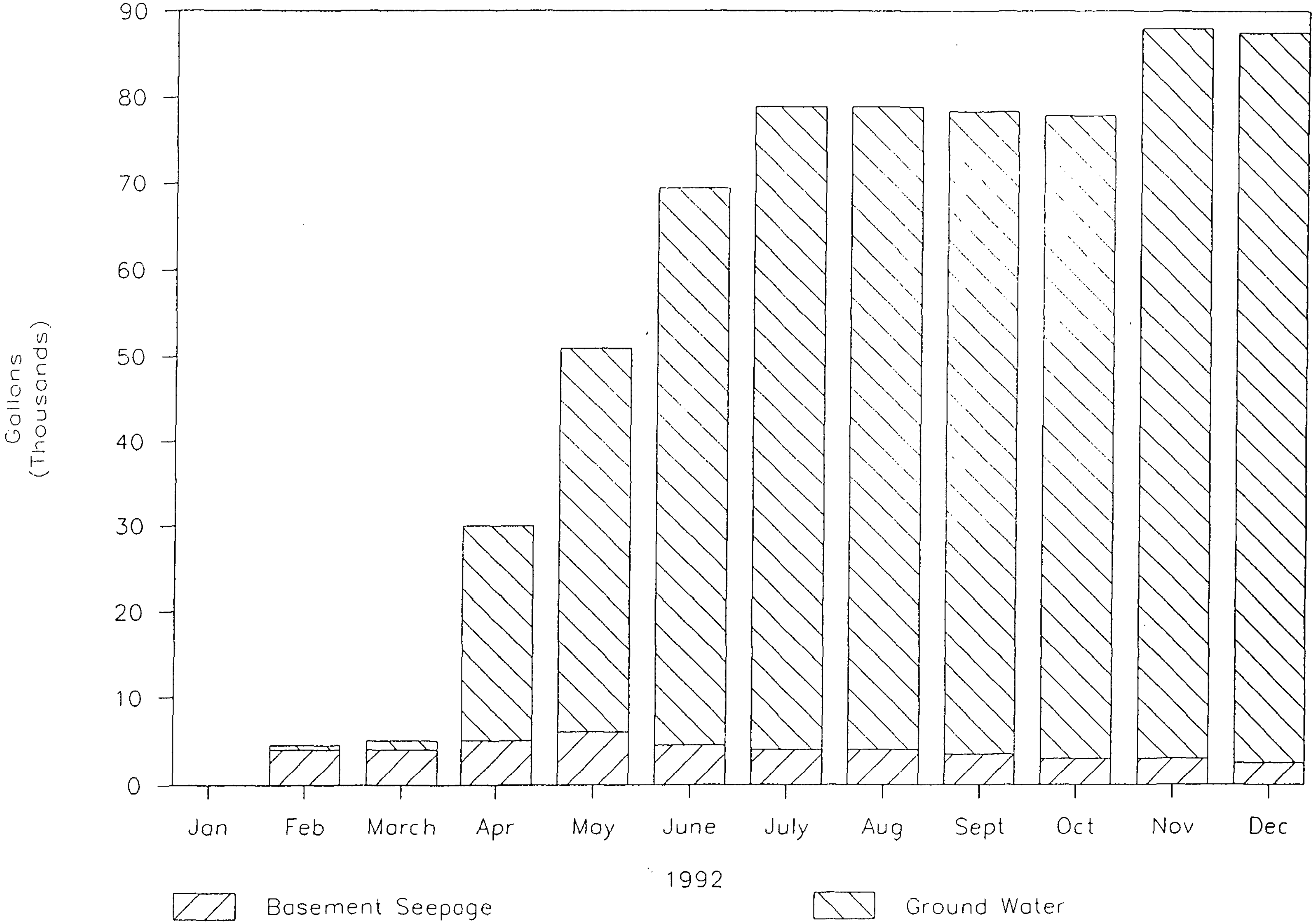
88418 0008

## 1.4 Water Discharge Requirements

The remediation system as designed by ENVIRON will produce 6,300 gpd of treated water. The remediation system, as installed and modified by HR/E, 10,000 gpd. Currently a flow rate of 4.33 gpm or 6,235 gpd is acceptable according to the air discharge permit. Considering the currently permitted flow rate of 4.33 gpm (6,300 gpd) and 10 hr/day operation five days per week, 50 weeks per year, effluent volumes total 650,000 gallons per year. Following some break-in period and some time to evaluate the impact of pumping, the system flow rate may be increased to a nearly 24 hour period. This would result in treatment of 1,500,000 gallons per year. We have projected pretreatment system effluent of 550,000 gallons for 1992, as shown in Figure 4. Of course this estimate is dependent on receipt of permits for treatment and discharge.

# Figure 4

Projected Pretreatment System Effluent




884180010

## 2.0 IDENTIFICATION OF DISCHARGE ALTERNATIVES (Task 1)

Six alternatives have been identified for discharge of the pretreatment system effluent. These include, substituting FO production well water used for non-contact cooling with the pretreatment system effluent (abbreviated as the "cooling water substitution" method), directly discharging system effluent to the Saddle River (abbreviated as the "surface water discharge" method), injection of the pretreatment system effluent into one of the subsurface aquifers (abbreviated as the "ground-water discharge" method), substituting pretreatment system water for FO city water used in make-up of product (abbreviated as the "product water substitution" method), substituting pretreatment system water for FO city water used as the plant's potable water supply (abbreviated as the "potable water substitution" method), and transporting the water to a permitted facility for off-site disposal.

A seventh alternative is also presented here for consideration. This alternative is discharge to the PVSC on a managed basis. Management of the discharge would be batch discharge during low-flow time periods and suspended discharge during high-flow time periods.

## 3.0 SCREENING OF DISCHARGE ALTERNATIVES (Task 2)

Screening of alternatives is based on factors that are considered obvious and definitive. Factors include environmental liabilities, public concern, technical feasibility and cost. Of the identified alternatives two have been eliminated through the screening process. The eliminated alternatives are the product water substitution method and the potable water substitution method.

### 3.1 Product Water Substitution Method

#### 3.1.1 *Description of Method*

This method consists of using the pretreatment system water as the supply for the water based products that FO produces and sells to its clients. FO has in the past and continues to use the city water supply that is available. Implementation of this method would require modification of the existing water delivery system in the plant to accommodate the second water source. The city source could not be eliminated so that a backup source was always available. FO currently uses city water with an annual production of approximately 1,000,000 gallons.

#### 3.1.2 *Evaluation of Method*

This method has a number of serious difficulties including, the general water quality (e.g. hardness, iron content, etc.), the product liability in using potentially contaminated water, and the cost of the water delivery system. The product liability issue seems to be most troublesome.

Therefore, this method has been eliminated from further discussion.

### 3.2 Potable Water Substitution Method

#### 3.2.1 *Description of Method*

This method consists of substituting pretreatment system water for FO city water used as the plant's potable water supply. The system would require modification of the plants sanitary water supply.

#### 3.2.2 *Evaluation of Method*

This system would not be viable due to a variety of public health problems. Therefore, this method has been eliminated from further discussion.

## 4.0 EVALUATION OF DISCHARGE ALTERNATIVES (Task 3)

The evaluation of discharge alternatives includes a description of the alternative and an assessment of the aspects of the alternative to determine its technical, environmental and physical feasibility.

### 4.1 Discharge to Surface Water Method

The direct discharge of pretreatment system effluent to surface water would involve either discharge to the storm sewer that transverses the facility or discharging directly into the Saddle River. This discharge would require an NJPDES/DSW ("Discharge to Surface Water") permit. An application for a discharge to surface water permit was submitted on December 18, 1991 (Appendix A). This permit will be difficult to obtain due to requirement for the applicant to evaluate the environmental condition of the receiving water. The discharge limits will be based, in part, on the evaluation of the condition of the stream. For example, the more highly contaminated the stream, the more likely that effluent limits will be strict. Some parameters may be assigned values that are technically impossible to obtain given sampling and analytical constraints.

Repeated sampling rounds of the receiving waters under varying conditions will be required as a prerequisite to the issuance of a permit. Such an evaluation of the stream's environmental condition will take a year or more.

The limits of the permit may mandate engineering a monitoring system that will make other alternatives more appropriate.

#### 4.1.1 *Available Saddle River Information*

The figures to follow are preliminary examples of the data compiled for the Saddle River. Saddle River discharge data has been obtained for the past 10 years, and is presented as total monthly discharge in Figure 5. Saddle River stage data from the USGS Lodi gage station located 3/4 of a mile upstream from the former Hexcel Corporation site was obtained for the period of January 1991 through October 1991. The elevations were adjusted to reflect the elevation of the stream near the site. The adjustments were based on several field measurements made during June and July of 1991, these were compared to elevations recorded at the gage station. Figures 6 and 7 are examples of the preliminary stage, precipitation, and available ground-water elevation data. There is some question concerning the quality of the data obtained, specifically whether the stage elevations are truly representative of the river stage near the site. By over looking the actual elevation value and examining the pattern of the data some relationships can still be investigated.

# SADDLE RIVER

LODI, N.J.

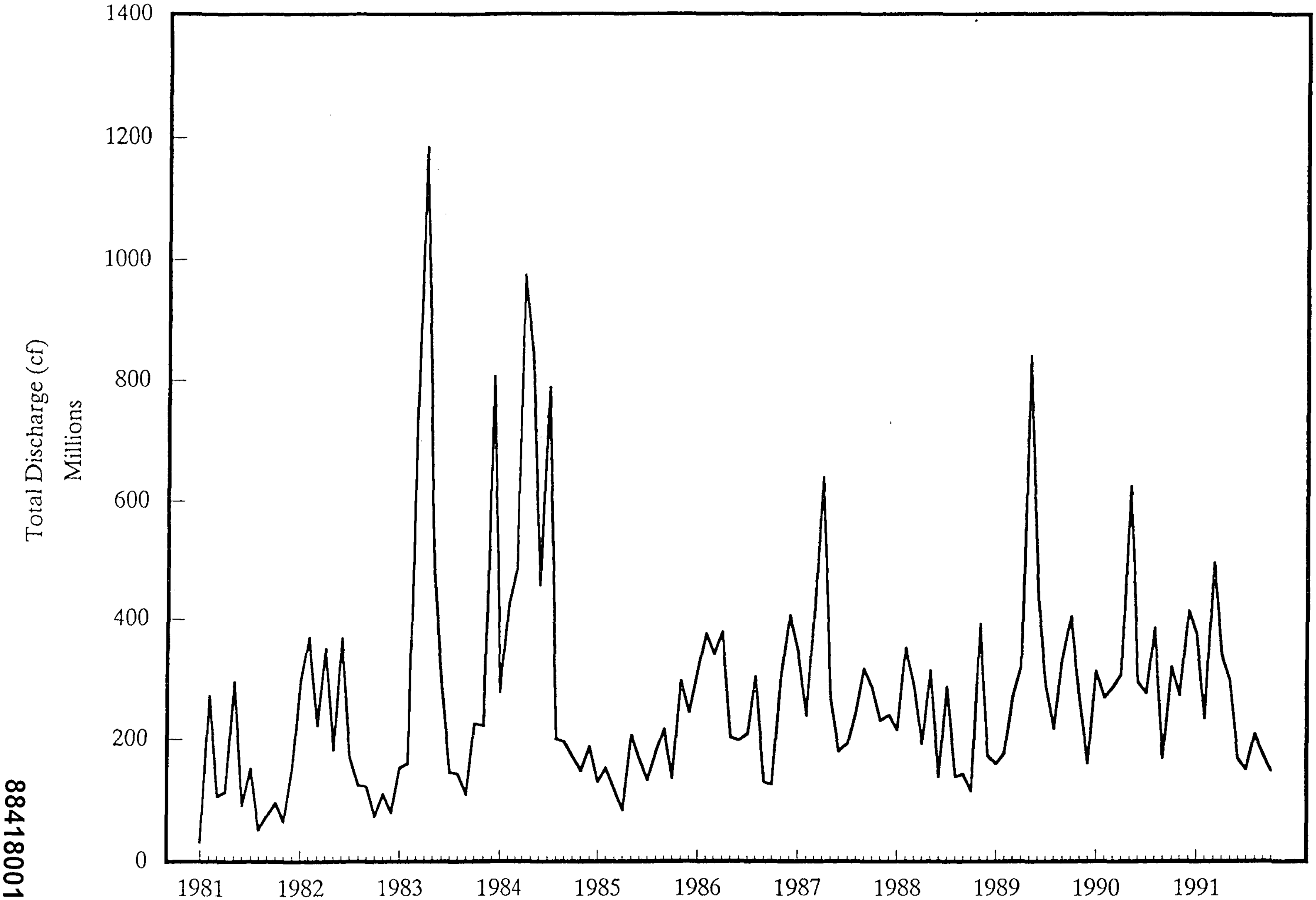
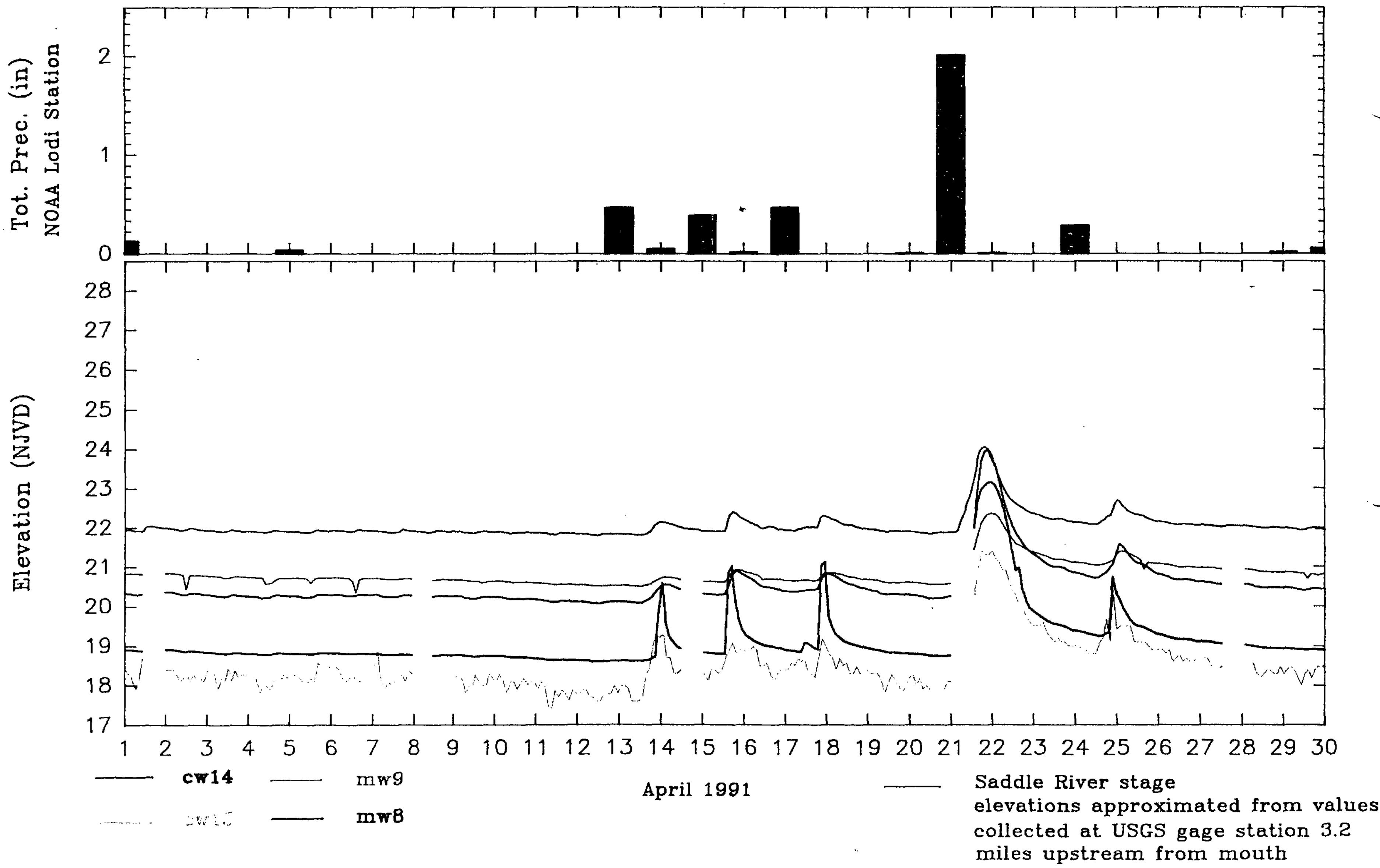



FIGURE 5

88418001 4

# FIGURE 6

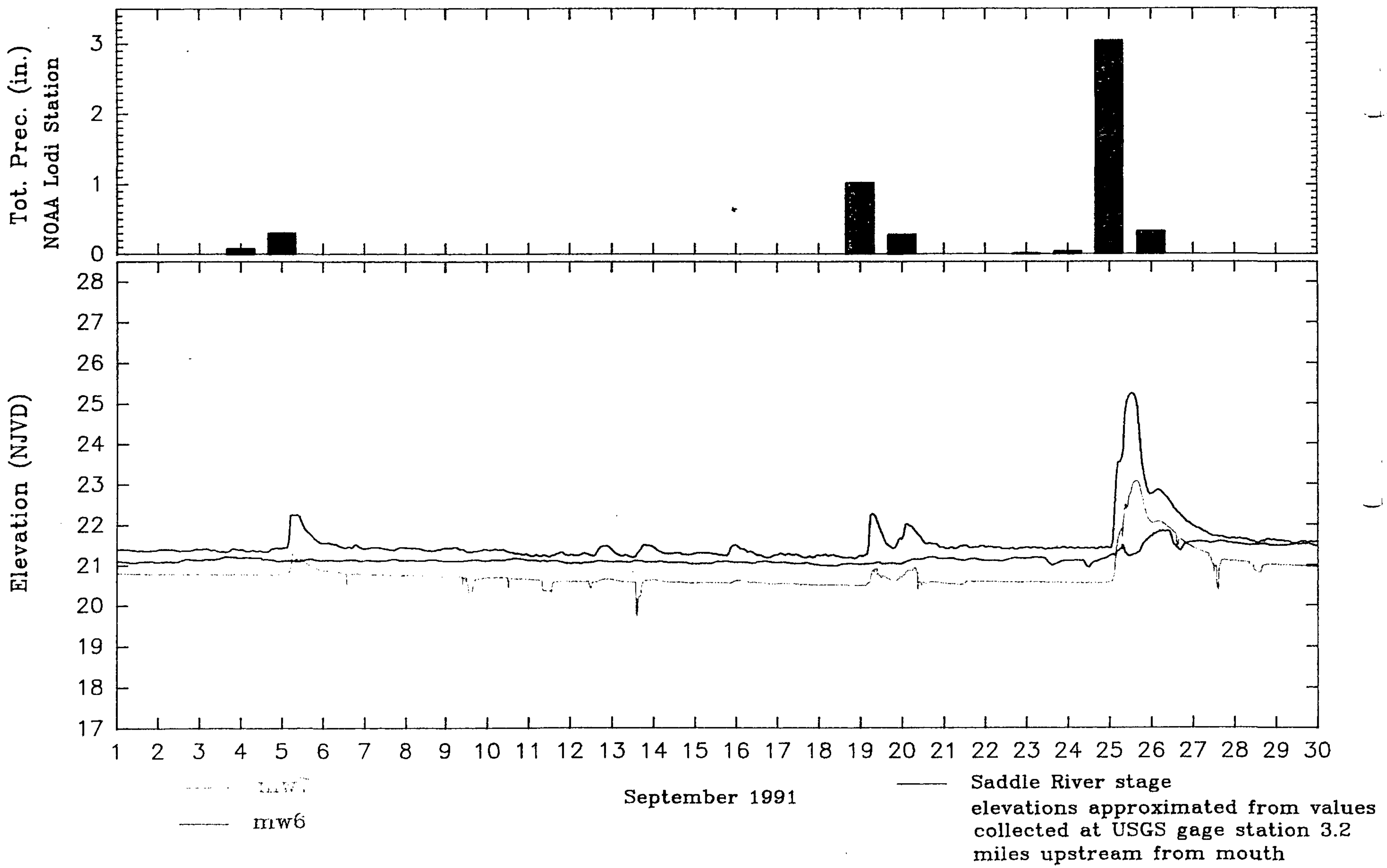
FORMER HEXCEL CORP. SITE
LODI, NJ




88418O015

# FIGURE 7

**FORMER HEXCEL CORP. SITE**
**LODI, NJ**




884180016

The total monthly discharge hydrograph (Figure 5) shows that during the past 10 years peak monthly discharges have occurred during the spring months, with an occasional peak during a winter month. Most of the low discharge periods have occurred during the fall months. An aquifer recharge value was calculated using a baseflow analytical method (Fetter, 1988). The aquifer recharge was determined by taking the difference between the potential ground-water recharge at the end of one recession and the total potential ground-water recharge at the beginning of the next recession. The aquifer recharge value averaged 3.0 inches over the past 10 years. This value did not take into account undeterminable abstractions like ground-water pumpage and surface water diversion upstream.

In Figures 6 and 7, the data demonstrates a direct relationship between precipitation and river stage. A direct relationship also exists between precipitation, river stage, and ground-water elevation in the upper and lower overburden aquifers. These relationships are present both in the April 1991 and August 1991 hydrographs. An unexplained "noise" was present in the CW15 transducer, but the data still follows the trend of the other upper overburden aquifer wells CW14 and MW8. Several disproportionate increases in elevation occurred in CW14 and MW8 after rainfall events which may have been the result of surface runoff into their loosely sealed well heads. MW6, an upper overburden aquifer well, responds more subtly to precipitation pulses than the other wells, but a direct relationship is still evident. The pattern of the stage hydrograph appears to represent a "flashy" stream, with a storm pulse passing through the system rapidly.

Stream profiles (Faraldi stream survey, 1990) of the Saddle River adjacent to the site are shown in Figure 8 and correspond to sections shown of Figure 1.

Saddle River water quality data has been obtained from the USGS, for the Lodi gaging station, covering the period of January through October 1991. Figures 9 through 12 present Stiff diagrams summarizing the major cations and anions present.

There are no known data for stream or sediment chemical constituents such as those found in on-site soils or waters.

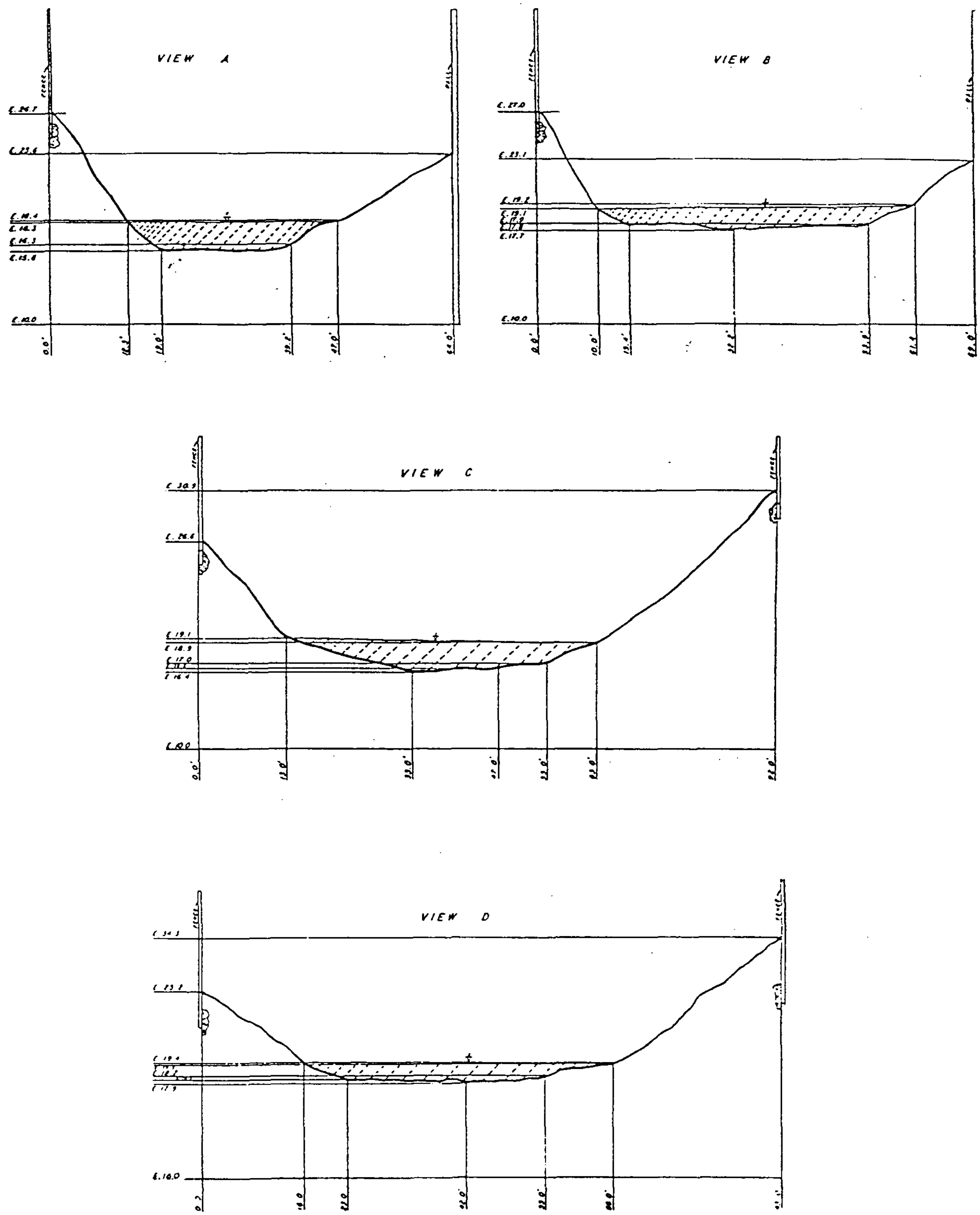
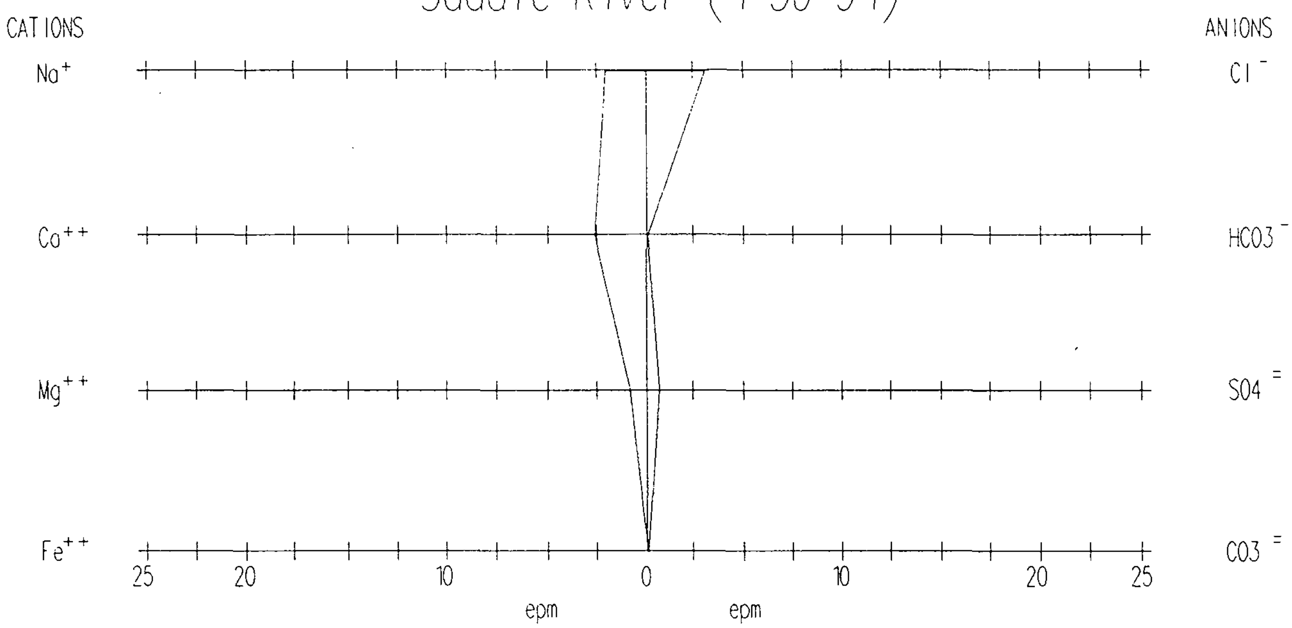



FIGURE 8
SADDLE RIVER PROFILES

# FIGURE 9

## Stiff Diagram of Saddle River (1-30-91)




| CATIONS: | | ppm | epm | %epm |
|---|---|---|---|---|
| SODIUM | $Na^+$ | 51.00 | 2.22 | 38.12 |
| POTASSIUM | $K^+$ | 2.70 | 0.07 | 1.19 |
| CALCIUM | $Ca^{++}$ | 51.00 | 2.54 | 43.73 |
| MAGNESIUM | $Mg^{++}$ | 12.00 | 0.99 | 16.96 |
| IRON | $Fe^{++}$ | NO ANALYTICAL | | |

error in cation/anion balance: 28.34%

| ANIONS: | | ppm | epm | %epm |
|---|---|---|---|---|
| CHLORIDE | $Cl^-$ | 96.00 | 2.71 | 83.34 |
| BICARBONATE | $HCO3^-$ | NO ANALYTICAL | | |
| SULFATE | $SO4^=$ | 26.00 | 0.54 | 16.66 |
| CARBONATE | $CO3^=$ | NO ANALYTICAL | | |
| NITRATE | $NO3^=$ | NO ANALYTICAL | | |

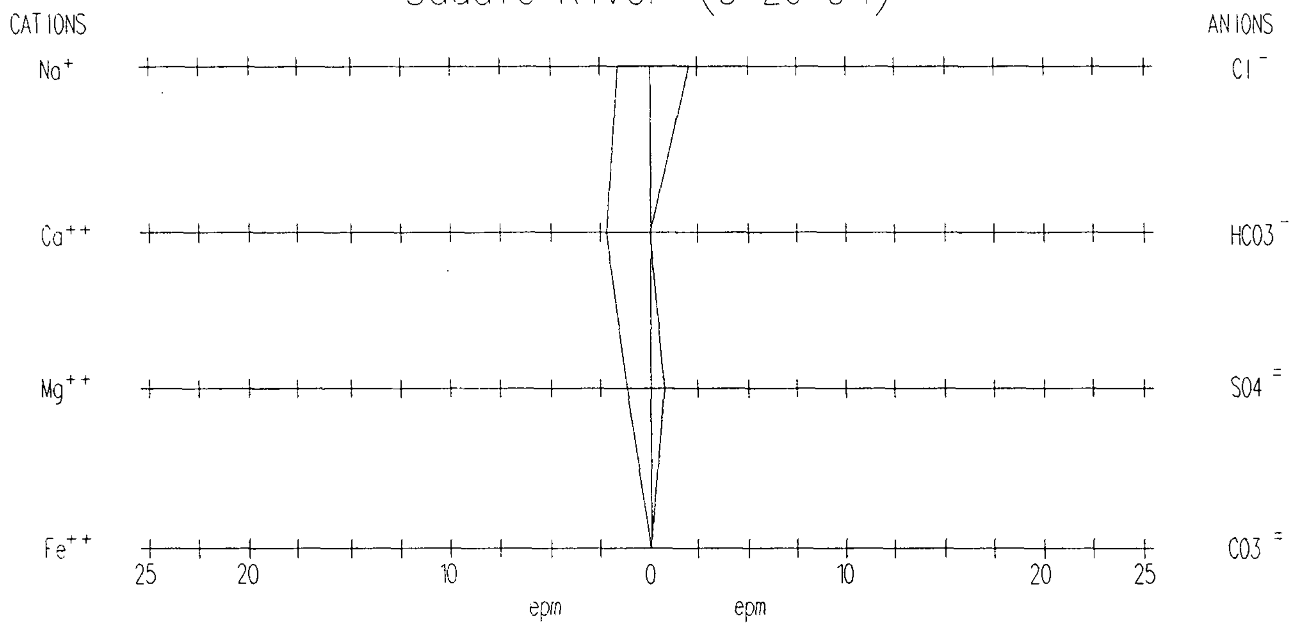
Total Hardness (as CaCO3): 176.78 (hard)

sadstif1.dwg

FORMER HEXCEL CORP. SITE
LODI, NJ
61020

# FIGURE 10

## Stiff Diagram of Saddle River (3-26-91)




| CATIONS: | | ppm | epm | %epm | ANIONS: | | ppm | epm | %epm |
|---|---|---|---|---|---|---|---|---|---|
| SODIUM | $Na^+$ | 43.00 | 1.87 | 36.06 | CHLORIDE | $Cl^-$ | 80.00 | 2.26 | 81.26 |
| POTASSIUM | $K^+$ | 2.60 | 0.07 | 1.28 | BICARBONATE | $HCO_3^-$ | NO ANALYTICAL | | |
| CALCIUM | $Ca^{++}$ | 47.00 | 2.35 | 45.21 | SULFATE | $SO_4^=$ | 25.00 | 0.52 | 18.74 |
| MAGNESIUM | $Mg^{++}$ | 11.00 | 0.90 | 17.44 | CARBONATE | $CO_3^=$ | NO ANALYTICAL | | |
| IRON | $Fe^{++}$ | NO ANALYTICAL | | | NITRATE | $NO_3^=$ | NO ANALYTICAL | | |

error in cation/anion balance: 30.26%

Total Hardness (as $CaCO_3$): 162.67 (hard)

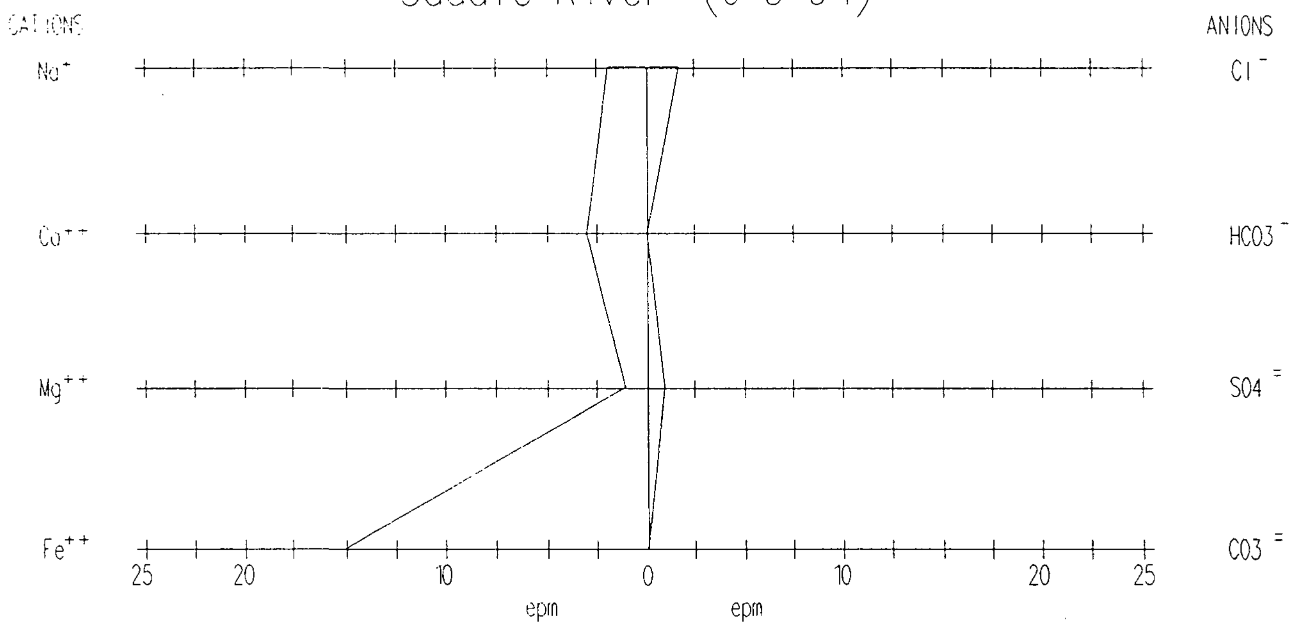
sadstif2.dwg

FORMER HEXCEL CORP. SITE
LODI, NJ
61020

884180020

# FIGURE 11

## Stiff Diagram of Saddle River (6-3-91)




| CATIONS: | | ppm | epm | %epm | ANIONS: | | ppm | epm | %epm |
|---|---|---|---|---|---|---|---|---|---|
| SODIUM | $Na^{+}$ | 52.00 | 2.26 | 10.57 | CHLORIDE | $Cl^{-}$ | 83.00 | 2.34 | 81.22 |
| POTASSIUM | $K^{+}$ | 4.50 | 0.12 | 0.54 | BICARBONATE | $HCO_3^{-}$ | NO ANALYTICAL | | |
| CALCIUM | $Ca^{++}$ | 55.00 | 2.74 | 12.83 | SULFATE | $SO_4^{=}$ | 26.00 | 0.54 | 18.78 |
| MAGNESIUM | $Mg^{++}$ | 15.00 | 1.23 | 5.77 | CARBONATE | $CO_3^{=}$ | NO ANALYTICAL | | |
| IRON | $Fe^{++}$ | 280.00 | 15.04 | 70.30 | NITRATE | $NO_3^{=}$ | NO ANALYTICAL | | |

error in cation/anion balance: 76.25%

Total Hardness (as CaCO3): 199.12 (very hard)

sadstif3.dwg

FORMER HEXCEL CORP. SITE
LODI, NJ
61020

884180021

### 4.1.2 *Nearby Surface Water Discharges*

There are a number of industrial and commercial activities up stream and down stream from the facility that may impact the surface water discharge permit conditions.

North of the facility are some small commercial businesses as well as a transfer station for solid waste disposal. We are unaware of any regulated discharges or violations relating to up stream activities. However, no search of state or local records has been performed.

Across the Saddle River from the facility is a salvage yard that was issued a state citation for polluting the river in 1991. An oil recovery boom has been in periodic use since that time for continued oil seepages from the ground into the river. At the same time, down river another salvage yard and a bus company were also cited for similar discharges. These discharges could affect stream samples taken at any time, either in evaluation of pre-existing conditions or during the course of compliance monitoring of the proposed Hexcel discharge.

NAPP Chemical Company is immediately adjacent to the facility to the south (downstream). NAPP does not have a NJPDES permit, nor do they discharge process water to the stream directly. NAPP does have drains from their parking lot that do discharge directly to the river.

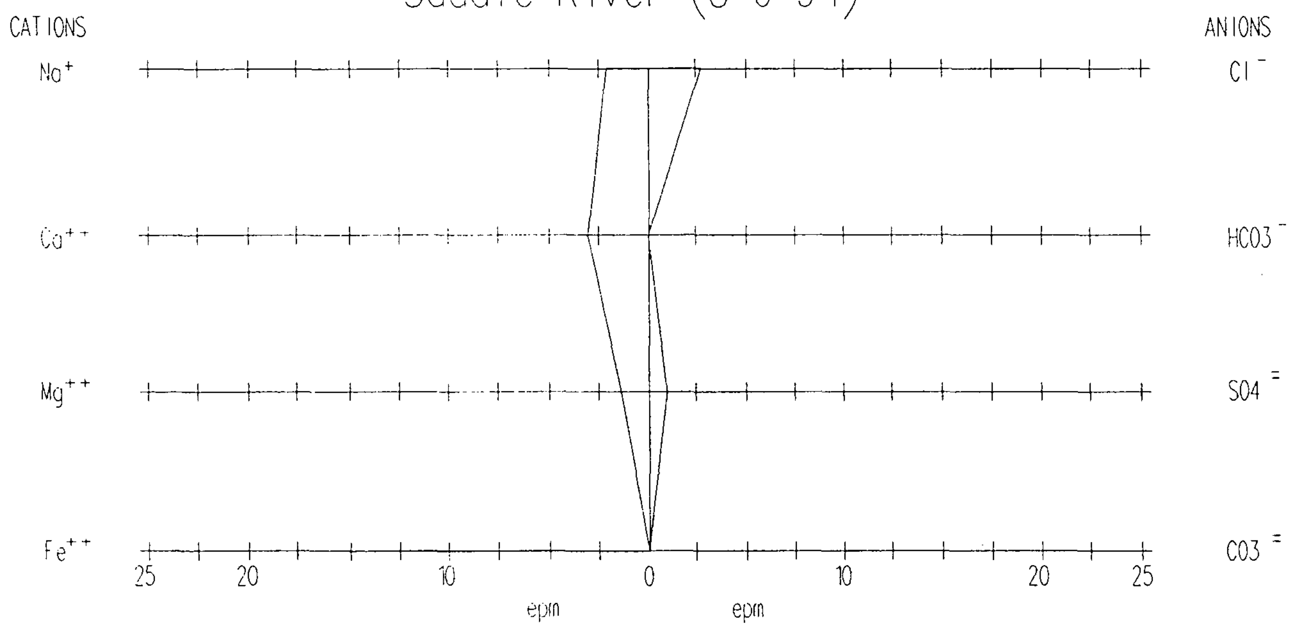
## 4.2 Discharge to Ground Water Method

Discharge to ground water would consist of reinjection of the extracted water into one of the aquifers following pretreatment. This discharge would require an NJPDES/DGW ("Discharge to Ground Water") permit. An application for a discharge to ground water permit was submitted on December 18, 1991 (Appendix B). The DGW permit should be more easily obtained than the DSW permit, however, implementation of the discharge is substantially more difficult than a discharge to surface water. In injection, of critical importance is the ability of the aquifer to accept the quantity of injected water. A conceptual model has been prepared to illustrate the available information regarding surface and subsurface features (Figure 13). An evaluation of the shallow overburden aquifer characteristics was prepared in October, 1990. An evaluation of the lower overburden aquifer characteristics was prepared in December, 1991. A summary of the conclusions of each report is included below along with a description of a possible injection/infiltration system.

The importance of a water bearing formation can be measured by its ability to transmit and to store water. These two hydraulic characteristics can be measured with the coefficients of transmissivity (T) and storativity (S).

# FIGURE 12

## Stiff Diagram of Saddle River (8-6-91)




| CATIONS: | | ppm | epm | %epm | ANIONS: | | ppm | epm | %epm |
|---|---|---|---|---|---|---|---|---|---|
| SODIUM | $Na^+$ | 52.00 | 2.26 | 35.55 | CHLORIDE | $Cl^-$ | 91.00 | 2.57 | 78.39 |
| POTASSIUM | $K^+$ | 5.50 | 0.14 | 2.21 | BICARBONATE | $HCO_3^-$ | NO ANALYTICAL | | |
| CALCIUM | $Ca^{++}$ | 53.00 | 2.64 | 41.56 | SULFATE | $SO_4^=$ | 34.00 | 0.71 | 21.61 |
| MAGNESIUM | $Mg^{++}$ | 16.00 | 1.32 | 20.68 | CARBONATE | $CO_3^=$ | NO ANALYTICAL | | |
| IRON | $Fe^{++}$ | NO ANALYTICAL | | | NITRATE | $NO_3^=$ | NO ANALYTICAL | | |

error in cation/anion balance: 32.04%

Total Hardness (as $CaCO_3$): 198.24 (very hard)

sadstif4.dwg

FORMER HEXCEL CORP. SITE
LODI, NJ
61020

884180023

Graphic representation of the results of these model runs are available in Figures 14 through 17. Discharge of treatment water into the upper overburden aquifer is a viable option and will be discussed in more detail in Section 5.2 of this report.

### 4.2.2 *Discharge to the Lower Overburden Aquifer*

Discharge to the lower overburden aquifer entails injecting pretreatment system effluent via an injection well system. The injection well system would consist of one or more wells of a specified diameter and screen length to adequately accept the discharge. Most simply, injection would be based on gravity drainage, or the head pressure created by the difference in elevation from the treatment system effluent to the ground-water surface. The well number and design is based on the hydraulic characteristics of the aquifer.

The hydraulic characteristics of the aquifer were evaluated by installing an 8-inch diameter well and conducting a 24-hour pumping test. Prior to the pumping test, water levels in monitoring wells were collected to establish any trend in water levels.

The lower overburden aquifer pumping test indicated that under ideal hydrogeological conditions, the maximum transmitting capacity of a 0.010-inch well screen with an entrance velocity of 0.1 ft/sec is 8.68 gpm/ft. Due to the moderate permeability of the formation, the average entrance velocity was only 0.05 ft/sec. This caused excessive drawdown in the pumping well.

Ground-water contours of the lower overburden aquifer were generated from data collected at the start of the pumping test, and at 900 minutes (optimum drawdown). Changes in water levels over this time period were used to show that pumping effected water levels extending as far as MW-19 (approximately 50 feet from the pilot well).

*In-situ* hydraulic conductivity tests were also conducted at other monitoring wells to compliment the pumping well test.

Our preliminary conclusions indicated that at least the upper portion of the bedrock aquifer is hydraulically connected to the lower overburden aquifer. During trend analysis of PI-1 and MW-9 prior to initiation of the pumping test an increase of approximately 0.30 feet in water levels were recorded in both wells 55 minutes after the PW pump was turned off.

Generally, the amount of water a well produces is much greater than the amount of water a well can accept. This means that a rate of injection should not exceed

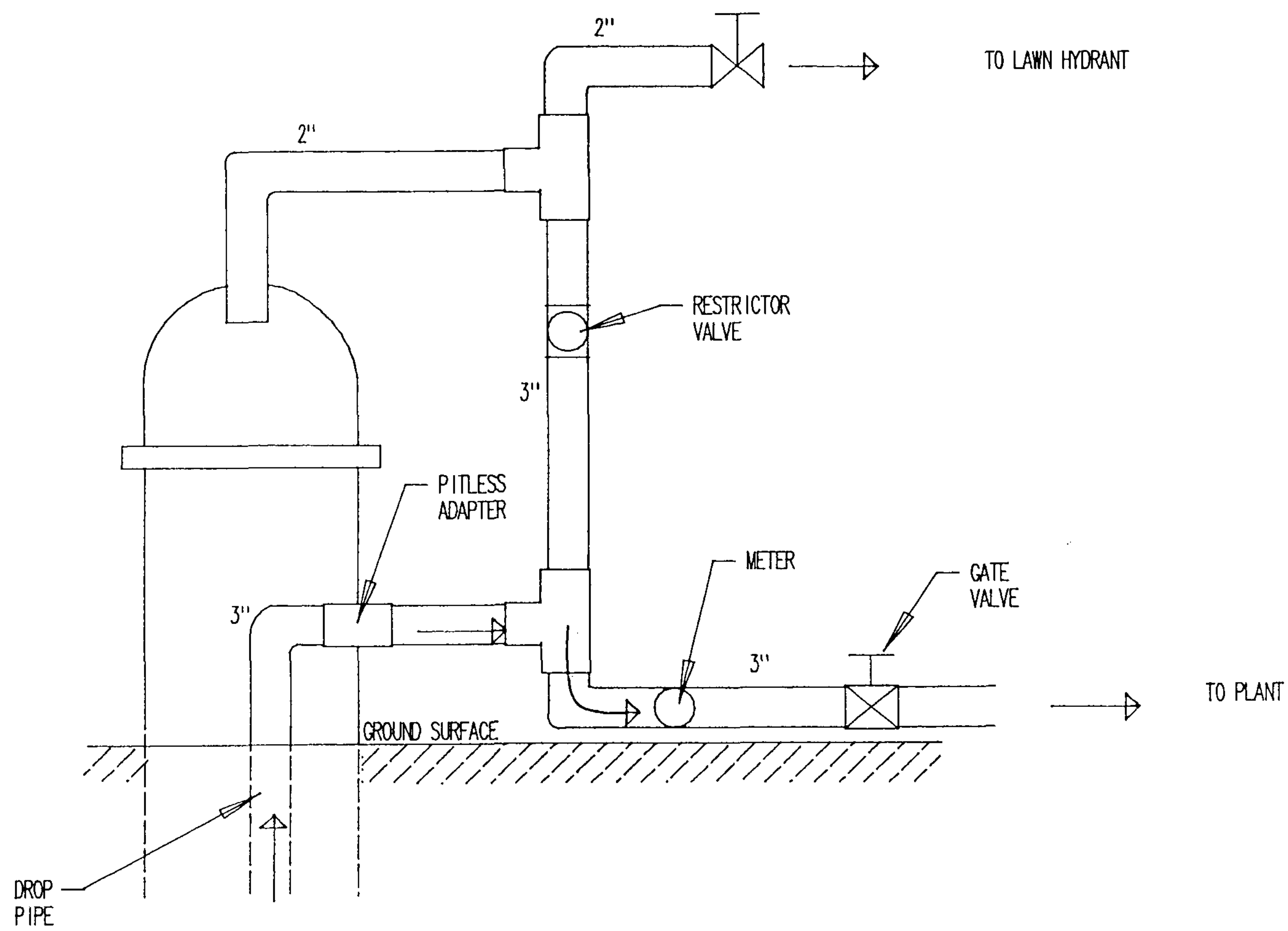

2"
TO LAWN HYDRANT
2"
RESTRICTOR VALVE
3"
PITLESS ADAPTER
METER
GATE VALVE
3"
3"
TO PLANT
GROUND SURFACE
DROP PIPE

FIGURE 19

two gallons per minute into wells set in the lower overburden aquifer. Therefore, to inject four gallons per minute on a long term basis into the lower overburden aquifer, two or three wells of similar construction would be required.

Injection is more difficult to accomplish than extraction primarily because chemical and biologic activity affects the well and aquifer performance. Biologic growth and encrustation will tend to plug the well screen and soil interstices limiting flow.

There is the potential for off-site migration of VOCs and vertical migration of VOCs to the bedrock aquifer using this option. Control of the potential for off-site migration would produce additional influent load for the pretreatment system. In addition, the FO production well could be affected by vertical migration of VOCs which in turn could affect any end usage of this water source.

Therefore, discharge to the lower overburden aquifer is eliminated from consideration.

## 4.3 Discharge to PVSC, FO Cooling Water Substitution Method

This alternative would consist of discharge of the pretreatment system water to the PVSC. This alternative would reduce discharge of non-contact cooling water derived from an on-site bedrock well. Instead, cooling water would be derived from the pretreatment system, thus the substitution. The cooling water is disposed of to the PVSC.

### 4.3.1 *FO Cooling Water System*

FO derives its cooling water from a production well located south of the Warehouse (Bldg. 5) as shown in Figure 18. The well is completed into the bedrock aquifer beneath the site. Figure 19 illustrates the production wellhead configuration. The cooling water system distribution piping is shown on Figure 18. Generally, the submersible pump located in the production well is on during plant operating hours. A restrictor valve diverts water back into the well at the wellhead when there is no cooling water demand.

Water for cooling is used in cooling jackets for 12 tanks and a scrubber system. The system water is also plumbed to four hose outlets. Water is obtained at each location via a manually operated valve. Discharge from each location is to either floor drains or catchment basins that lead to the PVSC industrial sewer.

### 4.3.2 *FO Cooling Water Use*

According to FO plant records, during the past 24 months FO has used 250,000 to 300,000 gallons of water per month. Cooling water use on a monthly basis from 1989 to 1991 is presented in Figure 20. Cooling water use is monitored at a totalizing flow meter located at the bedrock production wellhead (Figure 19). Water use at each location is based on product orders and production schedules. No metering at specific locations is performed.

### 4.3.3 *FO Cooling Water Quality*

On October 18, 1991 production well water was sampled for general water chemistry and volatile organic compound (VOC) analysis. Table 2 presents a summary of analytical results. This sample represents the quality of water prior to non-contact cooling. Figure 21 presents a Stiff diagram of general water quality characteristics.

# FINE ORGANICS CORP.

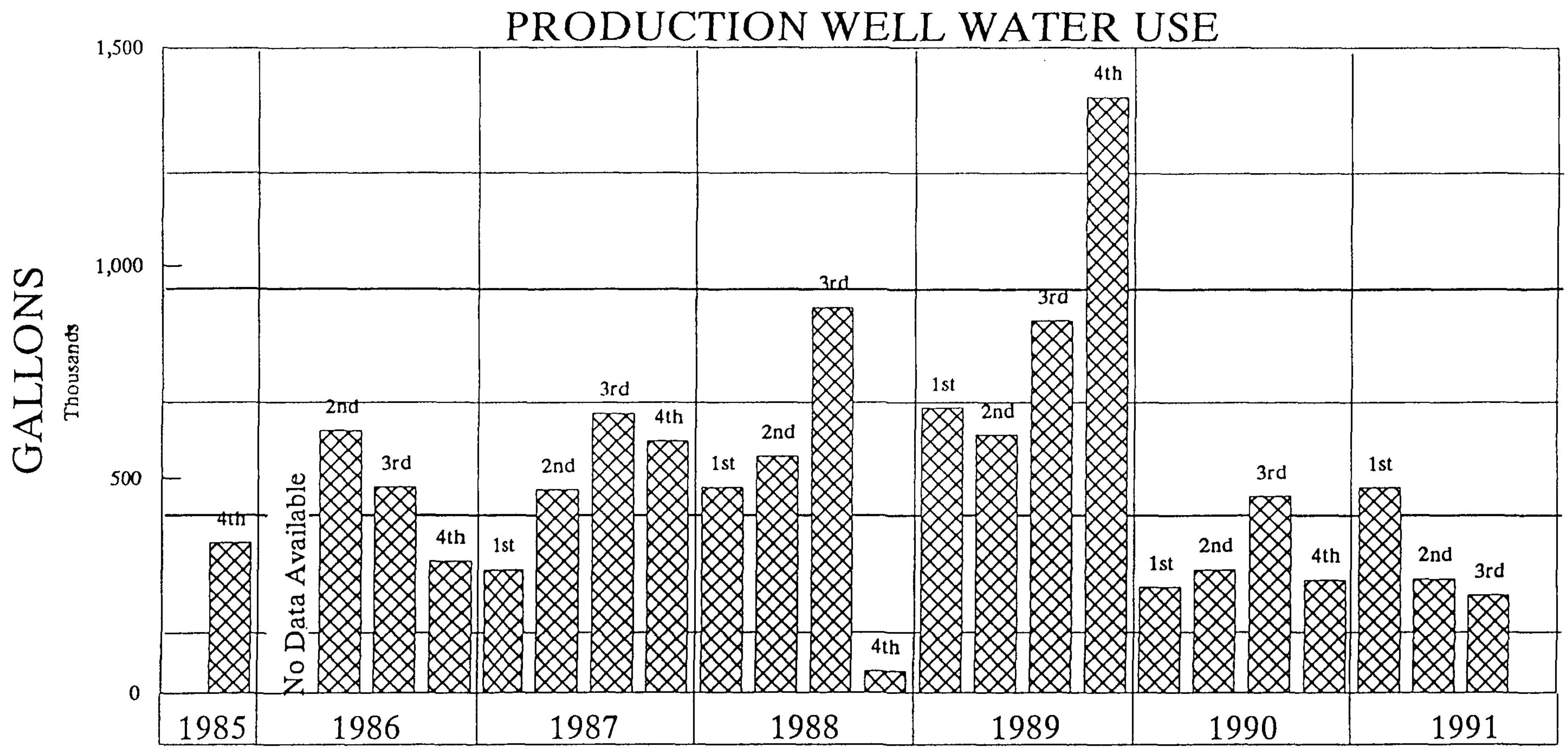



Figure 20

884180028

92JR1001.T1

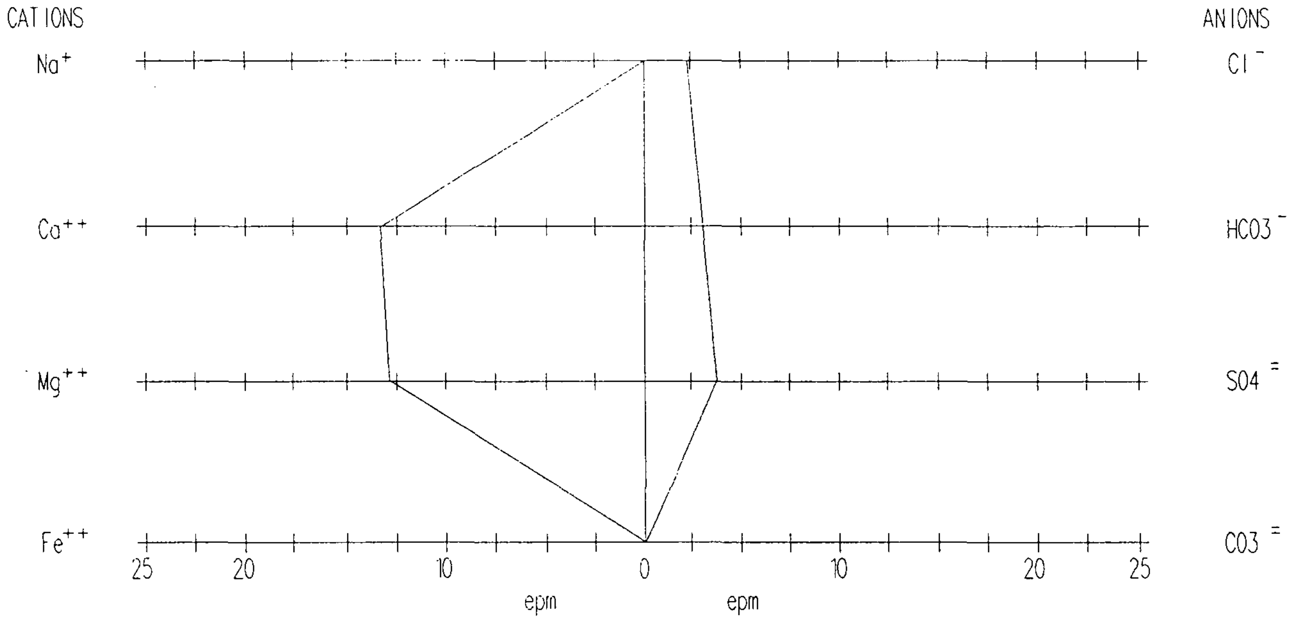
Table 2. Summary of Production Well Water Quality Analytical Data

| Analysis | Results (mg/l) |
|---|---|
| Total Cadmium | 0.88 |
| Total Chromium | 0.39 |
| Total Copper | 0.31 |
| Total Lead | ND (0.1) |
| Total Arsenic | ND (0.005) |
| Total Selenium | ND (0.005) |
| Total Zinc | 0.30 |
| Total Mercury | ND (0.00005) |
| Iron | 1.05 |
| Potassium | 3.17 |
| Calcium | 267.0 |
| Magnesium | 157.0 |
| Carbonate | 2.0 |
| Bicarbonate | 177.0 |
| Sulfate | 180.0 |
| Chloride | 76.0 |
| pH | 2.13* |
| Conductance | 30,200 $\mu$mhos/cm |
| Total Alkalinity | 179.0 |
| Hardness | 434.0 |
| Methylene Chloride | 0.034 |
| Trichloroethene | 0.012 |

* pH measurement was taken from an acidified bottle, pH is approx. 7.0

# FIGURE 21

## Stiff Diagram of FO Production Well




| CATIONS: | | ppm | epm | %epm | ANIONS: | | ppm | epm | %epm |
|---|---|---|---|---|---|---|---|---|---|
| SODIUM | $Na^+$ | 0.00 | 0.00 | 0.00 | CHLORIDE | $Cl^-$ | 76.00 | 2.14 | 24.20 |
| POTASSIUM | $K^+$ | 3.17 | 0.08 | 0.31 | BICARBONATE | $HCO_3^-$ | 177.00 | 2.90 | 32.75 |
| CALCIUM | $Ca^{++}$ | 267.00 | 13.32 | 50.51 | SULFATE | $SO_4^=$ | 180.00 | 3.75 | 42.30 |
| MAGNESIUM | $Mg^{++}$ | 157.00 | 12.91 | 48.97 | CARBONATE | $CO_3^=$ | 2.00 | 0.07 | 0.75 |
| IRON | $Fe^{++}$ | 1.05 | 0.06 | 0.21 | NITRATE | $NO_3^=$ | 0.00 | 0.00 | 0.00 |

error in cation/anion balance: 49.71%

Total Hardness (as $CaCO_3$): 1313.22 (very hard)

prodstf.dwg

FORMER HEXCEL CORP. SITE
LODI, NJ
61020

884180030

## 4.4 Off-Site Disposal Method

Off-site disposal of pretreated water would consist of loading and hauling three truck trailers per day to a treatment plant such as the Deepwater, NJ Dupont facility. For consideration here, the water would require pretreatment to eliminate polychlorinated biphenyl compounds (PCBs). The strength of the source of PCBs is such that the collected ground water and basement seepage water will exceed acceptable levels at most industrial waste water treatment facilities, such as at Dupont's Deepwater, NJ plant. Without pretreatment, the derived water would have to be incinerated as a liquid waste.

To implement this alternative additional tankage would be required to provide temporary storage for accumulation treated water awaiting transfer to tanker trucks.

## 4.5 Regulated Discharge of Pretreated Water to the PVSC

Regulated discharge of pretreated water to the PVSC would consist of holding pretreated water on-site until an approved discharge time. Regulated discharge would be performed according to specific constraints for time of day and for Saddle River flow rate or stage. Other constraints could be established.

The time of day constraint could be established to avoid higher flow periods at the treatment plant due to residential and commercial activities. For example, discharges could be avoided between the hours of 6:00 am to 8:00 pm each day.

Since PVSC treatment demand requirements increase during periods of high precipitation and river stage, discharge can be adjusted to avoid contribution during peak periods. Since the Saddle River is part of a flood control network, gaging of river flow is performed on a continuous basis. The gaging station is approximately one mile up stream of the site.

To implement this alternative additional tankage would be required to provide temporary storage for accumulated treated water during times at which discharge would be prohibited. A pumping and control system would also be required.

## 5.0 DETAILED ANALYSIS OF DISCHARGE ALTERNATIVES (Task 4)

The evaluation of the discharge alternatives includes a technical, environmental, public health, institutional, and cost analysis of the alternative. The technical analysis consists of a means to accomplish the discharge objective. This includes general information regarding equipment and its configuration. The public health analysis consists of the impact of the alternative to workers and the general public who may be affected by the discharge alternative. The institutional analysis consists of the constraints imposed by regulatory requirements at all levels of government. The cost analysis consists of the financial considerations in implementing the alternative.

### 5.1 Discharge to Surface Water Method

The evaluation of discharge to the Saddle River includes a technical, environmental, public health, institutional and cost analysis of the alternative. The technical analysis outlines the preferred method of introducing pretreated water to the storm sewer transversing the site and the alternate method of introducing the pretreated water directly into the Saddle River. The public health issue is analyzed with respect to the potential impact on workers and the general public which may be affected. The institutional analysis discusses constraints imposed by the NJDEP. The cost analysis consists of financial consideration in implementing the proposed alternative.

#### 5.1.1 *Technical Analysis*

The two methods of introducing the pretreated water to the Saddle River are discharging it through the existing storm sewer system or discharging directly into the Saddle River. Discharging to the storm sewer would require the installation of a 4 inch connecting pipe to manhole no. 2 (see Plate 2, Appendix A). The storm sewer is located approximately 50 feet west of Building 1. Installation of a discharge line directly to the river would require laying approximately 140 feet of 4 inch pipe from Building 1 to the stream. Both pipe installations would require on site trenching activities through soils potentially containing organic contaminants requiring protective measures. Debris and underground utilities may also be encountered.

Discharging the pretreated water to the river will impact both the rivers flow and water quality. Presently the treatment system is permitted to produce 4.33 gpm or approximately 6,300 gpd. These are the acceptable values according to the air discharge permit. For the period of January 1991 to October 1991 the mean daily discharge of the Saddle River as recorded at the USGS Lodi gaging station was 8.5 million gallons. Introducing 6,300 gpd to the river would only increase the discharge by 0.07%. The lowest recorded daily discharge over that period was

8.4 million gallons which would also result in a negligible flow increase. For the period of January 1981 to October 1991 the lowest recorded daily discharge was 5.1 million gallons, adding the 6,300 gallons would only represent an increase in flow of 0.1% over the Saddle River's lowest discharge point of the past 10 years. The addition of the pretreated water at the current rates appear to be an insignificant increase and would have a minimal impact on the river.

The water quality of the river would be minimally impacted by the introduction of the pretreated water. Four scenarios of water quality impact on the river have been considered. The introduction of treatment effluent to the river, at low flow conditions and average flow conditions, would result in an estimated increase in the VOC level of 0.023 $\mu g/\ell$ and 0.014 $\mu g/\ell$, respectively. Also, the accidental discharge of untreated water, assumed to contain 200 $mg/\ell$ of VOCs, to the river at low flow and average flow conditions would increase the VOC concentration by 244 $\mu g/\ell$ and 148 $\mu g/\ell$, respectively. Calculations are presented as Appendix D.

### 5.1.2 *Public Health Analysis*

These alternatives have a moderate public health impact. The potential for exposure exists in the event of a treatment system failure. Discharging directly to the river may pose a slightly higher risk because of the increased likelihood of the general public having contact with a surface water stream over contact with water in a storm sewer. The storm sewer alternative may provide the opportunity for a contaminated discharge to dilute before reaching the river, thus decreasing the potential for public exposure.

### 5.1.3 *Institutional Analysis*

Implementation of this alternative is impacted by the Wastewater Facilities Regulation Element of NJDEP. A permit application was submitted on December 18, 1991. Sampling of the Saddle River will be required to evaluate the environmental condition of the river. This sampling will require approximately 1 year to complete. The DSW permit application and approval is processed on a first in/first out basis, which may require at least another year to complete. The river condition and sampling requirements are thoroughly addressed in "A Proposal for Determination of Water Quality Effluent Limitations" which was submitted to the NJDEP as part of the permit application (Appendix A).

### 5.1.4 *Cost Analysis*

Operation, maintenance and disposal costs have not been considered here; however, they should not exceed $10,000 per month. Implementation of this alternative will have a moderate capital cost, that is dependent on permit conditions. Capital costs are estimated at $145,000.

## 5.2 Discharge to the Upper Overburden Aquifer Method

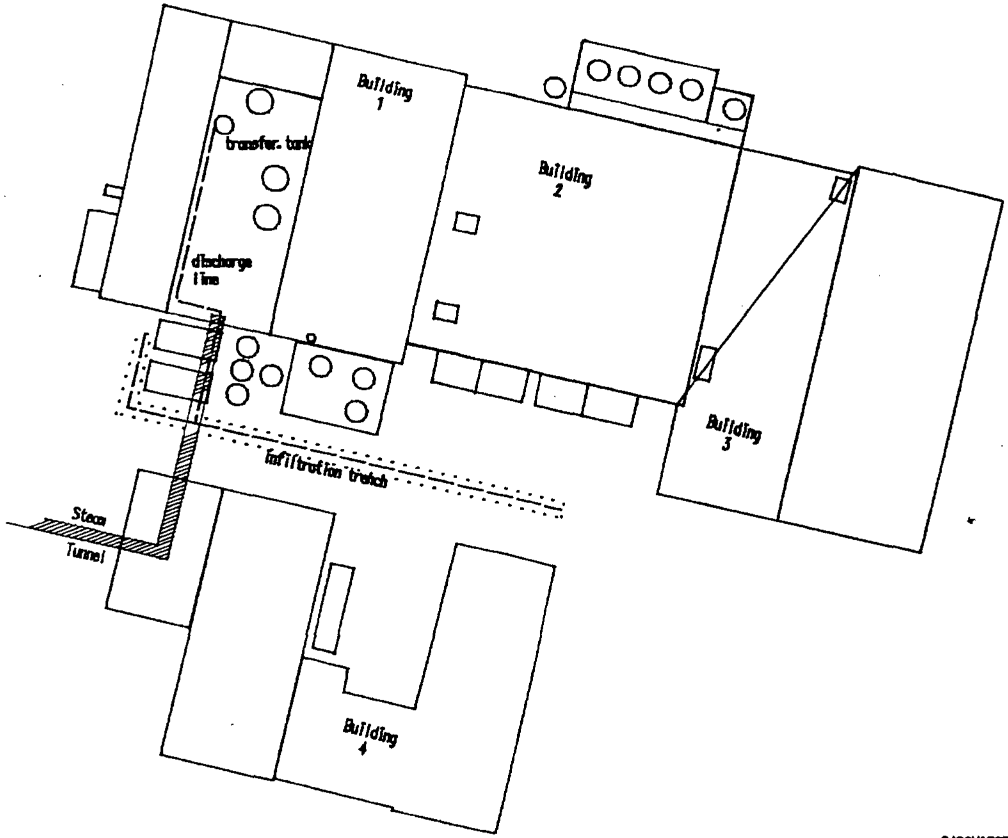
The evaluation of the discharge to the upper overburden aquifer includes a technical, environmental, public health, institutional and cost analysis of the alternative. The technical analysis outlines the preferred method of reinjection (infiltration gallery) in the most effective location for installation and the potential effects to the site. The public health issue is analyzed with respect to the potential impact on workers and the general public which may be affected. The institutional analysis discusses constraints imposed by the NJDEP. The cost analysis consists of financial consideration in implementing the proposed alternative.

### 5.2.1 *Technical Analysis*

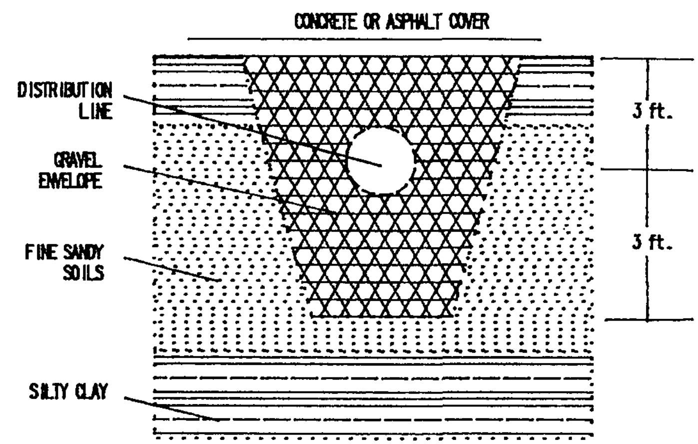
The technical analysis is broken down further into system engineering, the potential effects on chemical transport and migration, and implementation of system installation.

The ground-water discharge system should be located in the alleyway between Buildings 1, 2 and 3 and Building 4. The distribution system would consist of a perforated distribution line installed in a gravel envelope within a trench system. In addition to the pretreatment system that has been constructed, the discharge system would require either a large storage tank located on the upper deck of Building 1 for a gravity discharge system or a forced pumping system and smaller holding tank located in the basement of Building 1. The discharge line would be directed through the steam tunnel to the point of exit within the alleyway. Figure 22 shows a schematic of the discharge and distribution system.

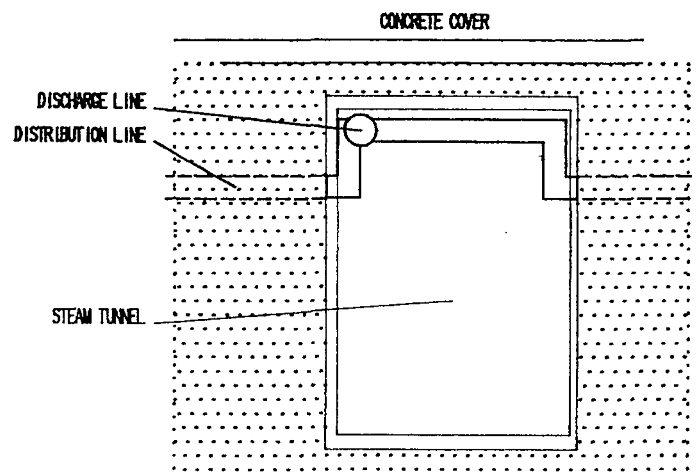
The distribution lines will be located in soils known to contain high concentrations of chemicals. The infiltration of pretreated ground-water into this area should mobilize a portion of these chemicals allowing removal via the ground-water collection system. This will however produce a mounding of the ground-water in this area. The present ground-water pumping system was designed to provide hydraulic control of a flow regime which did not include this mounding effect and may therefore require some alterations to provide complete hydraulic control. This control is essential to avoid forced migration of chemicals off-site.




PLAN VIEW




INFILTRATION TRENCH CROSS SECTION




STEAM TUNNEL CROSS SECTION

| | | |
|---|---|---|
| DISCHARGE TO UPPER OVERBURDEN AQUIFER | | |
| FIGURE 22 | | |
| HEXCEL PROJECT | LODI, NEW JERSEY | |
| HERITAGE REMEDIATION/ENGINEERING, INC.<br>5656 OPPORTUNITY DRIVE<br>TOLEDO, OHIO 43612 | | HERITAGE |
| REVISION: 002 | DATE: 1/10/91 | DRAWN BY: KDW |
| SCALE: NTS | DWG NO. HEX002 | APPROVED BY: JDR |

884180035

Several obstacles stand in the way of the installation of the discharge trench. Previous trenching activities to the west of Buildings 1, 2 and 3 have shown that the soils contain a considerable quantity of debris as well as numerous underground utilities both known and unknown. The area chosen for reinfiltration is expected to contain similar obstacles making trench construction difficult at best. The area chosen for reinfiltration is a main drive and work area for the plant. Construction activities will have to be performed in intervals or plant operations will be affected. The potential exists for uncovering soils containing high concentrations of chemicals requiring protective measures for workers installing the lines.

### 5.2.2 *Public Health Analysis*

The alternative has minimal impact on public health or worker exposure as long as adequate hydraulic control is maintained. A loss of hydraulic control in any section of the pumping system could allow the migration of chemicals off-site. The potential effects of off-site migration of chemicals on the public health or the environment is not adequately known at present.

### 5.2.3 *Institutional Analysis*

Implementation of this alternative would require application for a New Jersey Ground-Water Discharge (NJGWD) permit. Questions regarding the potential for off-site migration of chemically affected ground water will most certainly be raised. At present we have no reliable long term data to suggest that complete hydraulic control has been achieved or would continue following the initiation of reinfiltration.

### 5.2.4 *Cost Analysis*

Operation, maintenance and disposal costs have not been considered here; however, they should not exceed $10,000 per month. Implementation of this alternative would have a high financial obligation depending on the extent of alterations of the pumping system required to ensure hydraulic control. Capital costs are estimated to exceed $200,000.

## 5.3 Discharge to PVSC, FO Cooling Water Substitution Method

The evaluation of the discharge to PVSC via substitution for FO cooling water method includes a technical, environmental, public health, institutional, and cost analysis of the alternative. The technical analysis consists of a preferred method to substitute treated ground water for production well water. This includes general piping and control requirements. The public health analysis consists of the impact of the implemented method to workers and the general public who may be affected. The institutional analysis consists of the constraints imposed by the PVSC and NJDEP. The cost analysis consists of the financial considerations in implementing the alternative.

### 5.3.1 *Technical Analysis*

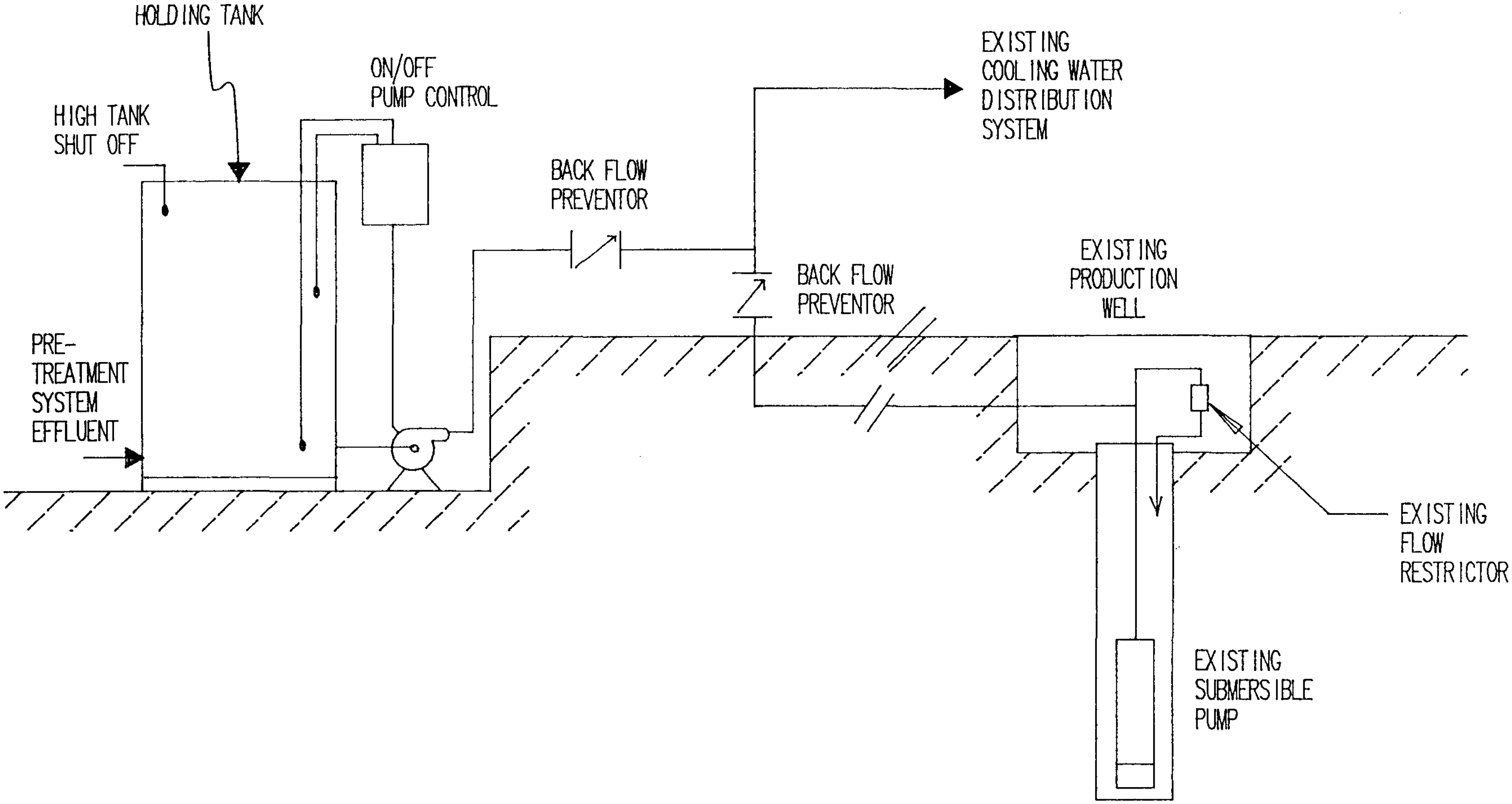
The substitution system would be attached to the existing system with little modification. The existing system is already piped through Building 1 near where the pretreatment system is located. In addition to the pretreatment system that has been constructed, an additional holding tank and pumping system would be required. Figure 23 shows a schematic of the substitution system. The existing cooling water system would be left in place to provide for additional cooling water volume when needed.

Monitoring of existing line pressure and flow rates will be necessary for the design of the substitution system. The pump will be sized to deliver water at a pressure exceeding the existing cooling water line pressure, and the holding tank(s) will be sized as needed to provide the required cooling water demand.

There are several unknown factors which make the evaluation of the feasibility of the substitution system difficult. The hour by hour pattern of cooling water usage in the FO facility is not known at this time, as there is no metering at specific locations. Over an extended period of time, cooling water use by FO seems to be on the same order of magnitude as expected treatment system discharge.

### 5.3.2 *Public Health Analysis*

This alternative has minimal public health impact. Assuming the pretreatment system is operating properly and the cooling water system is operating properly, then no exposure will occur.




| | | |
|---|---|---|
| FORMER HEXCEL CORPORATION | | |
| FIGURE 23 | | |
| SCHEMATIC OF COOLING WATER SUBSTITUTION SYSTEM | | |
| HERITAGE REMEDIATION/ENGINEERING, INC.<br>5656 OPPORTUNITY DRIVE<br>TOLEDO, OHIO 43612 | | HERITAGE |
| REVISION: 000 | DATE: 1-9-92 | DRAWN BY: HSW |
| SCALE: NONE | DWG NO. 6102002 | APPROVED BY: JDR |

884180038

### 5.3.3 *Institutional Analysis*

Implementation of this alternative is impacted by the PVSC and by FO. At a meeting between representatives of the PVSC, HR/E and Hexcel, the PVSC expressed disinterest in accepting any ground water. However, the PVSC already accepts cooling water derived from a ground-water source. The PVSC has acknowledged that substitution for ground water already being received from FO was viable and would be considered.

### 5.3.4 *Cost Analysis*

Operation, maintenance and disposal costs have not been considered here; however, they should not exceed $10,000 per month. Implementation of this alternative will have a moderate financial obligation. Capital costs for this alternative are estimated to be approximately $85,000.

## 5.4 Off-Site Disposal Method

The evaluation of the discharge to an off-site treatment/disposal facility includes a technical, environmental, public health, institutional, and cost analysis of the alternative. The technical analysis consists of a preferred method to transport the liquids to an approved facility. This includes general storage, transfer, and transportation activities. The public health analysis consists of the impact of the implemented method to workers and the general public who may be affected. The institutional analysis consists of the constraints imposed by the DOT, NJDEP and treatment facility. The cost analysis consists of the financial considerations in implementing the alternative.

### 5.4.1 *Technical Analysis*

The off-site disposal method would be attached to the existing system with little modification. The existing system is already piped through Building 1 near where the pretreatment system is located. In addition to the pretreatment system that has been constructed, additional holding tanks and a pumping system would be required.

The existing system will be augmented by additional tankage to hold treated water prior to tanker truck pickup. The existing pumping system will supply feed to the tanks. The tanker truck will have sufficient pumping capacity to transfer water to the tanker trailer without assistance.

Truck capacity should exceed 3,000 gallons, such that two loads per days should be required. Storage for treated water should exceed two loads or 6,000 gallons.

### 5.4.2 *Public Health Analysis*

This alternative has moderate public health impact. Potential exposures occur during transfer of treated water and in the event of an accident during transport. The Deepwater NJ disposal site is a distance of 130 miles from the facility. This would result in 260 loaded miles per day (65,000 miles per year).

### 5.4.3 *Institutional Analysis*

Implementation of this alternative is impacted by laws and regulations governing transportation as well as the treatment facility.

### 5.4.4 *Cost Analysis*

Implementation of this alternative will have the lowest capital cost, however the operating costs will exceed all other costs. Estimated disposal costs to the DuPont Chambers Works Deepwater, NJ facility are $1,400 per 5,500 gallon load. Transportation charges are estimated to be $880 per truck, using an estimate of 6,400 gallons of treated water per day. Twenty-four truckloads of water would require disposal per month at a cost of $55,000 ($660,000 per year). Capital costs are estimated to be approximately $48,000.

## 5.5 Regulated Discharge to the PVSC

The evaluation of the discharge to the PVSC, but in a controlled or regulated manner includes a technical, environmental, public health, institutional, and cost analysis of the alternative. The technical analysis consists of a control and storage system for transfer of pretreated water during acceptable time periods. The public health analysis consists of the impact of the implemented method to workers and the general public who may be affected. The institutional analysis consists of the constraints imposed by the PVSC and NJDEP. The cost analysis consists of the financial considerations in implementing the alternative.

### 5.5.1 *Technical Analysis*

The regulated discharge to the PVSC method would be attached to the existing system with little modification. The existing system is already piped through Building 1 near where the pretreatment system is located. In addition to the pretreatment system that has been constructed, additional holding tanks and a pumping system would be required.

The existing system will be augmented by additional tankage to hold treated water prior to discharge to the PVSC. The existing pumping system will supply feed to the tanks. The storage tanks will have sufficient capacity to maintain two days treated water or about 10,000 gallons.

### 5.5.2 *Public Health Analysis*

This alternative has minimal public health impact. Exposure to the public or workers even in the event of treatment system failure would be eliminated by this alternative.

### 5.5.3 *Institutional Analysis*

Implementation of this alternative is impacted by the PVSC. At a meeting between representatives of the PVSC, HR/E and Hexcel, the PVSC has expressed a disinterest in accepting any ground water for treatment.

### 5.5.4 *Cost Analysis*

Operation, maintenance and disposal costs have not been considered here; however, they should not exceed $10,000 per month. Implementation of this alternative will have a modest financial obligation. Capital costs are estimated to be approximately $80,000.

# 6.0 DISCUSSION OF THE SELECTED ALTERNATIVE

## 6.1 Summary of Alternatives

A summary of the alternatives evaluated is presented in Table 3. The discharge to ground water alternative included consideration of both discharge to the upper or the lower overburden aquifer. Discharge to the lower overburden aquifer was deemed inappropriate and was not considered in the detailed evaluation of alternates. Substitution of the pretreatment system effluent with either FO product water or FO potable water were also eliminated early on in the evaluation process. The alternative of regulated discharge of water to the PVSC was considered even though there has been no commitment from the PVSC to consider any long term discharge to the PVSC. The alternative was included in the event that some relaxation of the PVSC's current policy was possible.

## 6.2 Prioritization of the Alternatives

Table 3 presents the order of the summary of the alternatives for discharge.

Table 3. Summary of Order and Alternatives for Discharges

| Rank No. | Alternative No. | Technical Analysis | Public Health Analysis | Institutional Analysis | Cost Analysis |
|---|---|---|---|---|---|
| 1 | 5. Regulated Discharge to PVSC | Easy to Design and Implement | Low Impact | Permitting Unclear | Low to Implement, Operate, and Maintain |
| 2 | 2. Ground Water Discharge | Moderate to Design/Difficult to Implement | Low Impact | Moderate to Permit | High to Implement/Low to Operate/Medium to Maintain |
| 3 | 3. FO Cooling Water Substitution - PVSC Discharge | Easy to Design/ Moderate to Implement | Low Impact | Simple to Permit | Moderate to Implement/Low to Operate, and Maintain |
| 4 | 1. Surface Water Discharge | Easy to Design/Easy to Implement | Moderate Impact | Difficult to Permit | Moderate to Implement, Operate, and Maintain |
| 5 | 4. Off-Site Disposal | Easy to Design and Implement | Moderate Impact | Simple to Permit | Low to Implement/High to Operate/Low to Maintain |

Regulated discharge of effluent water to the PVSC is ranked as the best alternative because it provides a high degree of protection for the public and is easy to implement. Acceptance by the PVSC should be sought because controlled discharge should result in insignificant impact to the total PVSC discharge. High river stages are the typical reason for the PVSC being unable to meet their treatment limit. The requirement to restrict treatment to lower flow periods may not effect the actual period of Hexcel pretreatment system operation since flows to the river and ground water may be restricted during high river stage for other technical reasons.

Discharge of effluent water to the shallow overburden aquifer is the second recommended alternative. This alternative will allow remediation of shallow soils at the site. A pilot test will be required to determine the effectiveness of remediation and the impact to ground-water levels. Discharge of the quantity of water derived for ground-water control may result in off-site migration of contaminants at other locations. Therefore, the overall probability of success of the alternative is not as high as the other alternatives. Hexcel has pursued this option by submitting a permit application.

Discharge of effluent water to the PVSC following substitution of FO cooling water is ranked third among the alternatives. In addition to the current ranking, further evaluation may reduce the applicability of this alternative. This results from the possibility that FO may not use cooling water in sufficient quantity during the winter months and during the summer months they may use cooling water at a rate substantially exceeding that produced by the treatment system.

Discharge of effluent water to the Saddle River is ranked fourth among the alternatives. Technically this method is best because of its simplicity. Its low ranking, however, is a result of the difficulty in permitting, the potential for additional treatment requirements to meet yet to be determined discharge limits, and increased public exposure. Hexcel has pursued this option by submitting a permit application.

Discharge of effluent water to an off-site disposal facility is the last of the alternatives due to possible exposure during handling and due to financial considerations.